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PARAHO DEVELOPMENT CORPORATION

FOR THE GOOD OF MANKIND

MAKING TOMORROW'S DREAMS, TODAY'S REALITY

The shortage of domestic petroleum, the rising prices of crude oil, and the uncertainty of foreign oil supplies have increased the need for developing a commercial synthetic fuels industry. In the three connecting corners of Colorado, Utah and Wyoming are over 16,500 square miles of what is recognized as the most promising synthetic energy resource--oil shale.

The United States Geological Survey estimates this total western oil shale resource to be over two trillion barrels of oil. Presently, it is estimated that over 600 billion barrels (several times the reserves of the Middle East) of shale oil are recoverable with existing technology. Paraho Development Corporation is proud to be at the forefront of the development of this new and exciting industry.

Paraho, with its patented technology, has produced over 4,600,000 gallons of crude shale oil under environmentally acceptable conditions. Paraho's initial oil shale work began in the early 1970's when a group of 17 industry sponsors (Sohio, Southern California Edison, Cleveland-Cliffs, Kerr-McGee, Gulf, Shell, Amoco, Exxon, Davy McKee, Mobil, Sun, Webb Venture, Texaco, ARCO, Phillips, Marathon, Chevron) participated in the Paraho managed Demonstration Program. This Demonstration Program, privately funded at a cost of over $10,000,000, was carried out at the Anvil Points Oil Shale Mine and Retorting Facility near Rifle, Colorado. This facility is leased by Paraho from the Department of Energy. The program successfully demonstrated the Paraho technology in a pilot plant and semi-works retort.

Following the Demonstration Program, Paraho was selected by the United States Navy's Office of Naval Research and the Department of Energy to produce up to 100,000 barrels of shale

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oil. The purpose of this program was to produce and ship the largest amount of crude shale oil ever to be refined in a modern commercial refinery. This Paraho crude shale oil was refined by The Standard Oil Company of Ohio into petroleum products meeting strict military specifications.

The success of Paraho and its technology on U. S. shales provided an international reputation for having an oil shale technology that actually worked. Many foreign countries have sought Paraho's advice and expertise in the development of their oil shale deposits. Paraho has performed two pilot plant operations on Israeli shale and recently completed a pilot plant operation on Moroccan shale. Work on foreign shales and domestic shales is expected to continue at Anvil Points.

Operations at Anvil Points by Paraho have successfully produced large amounts of crude shale oil in long continuous operations with high yields and good service factors. More importantly, operations confirmed the environmental acceptability of the Paraho process. Paraho's operations have met all of the strict federal and state air and water emissions standards.

Environmental problems have been minimized using the Paraho technology. There are no fugitive dust problems, no expansion or "popcorn" effect problems with the retorted shale, and finally no water problems. The Paraho retort requires **no water.** On a commercial basis, approximately a barrel of water for every barrel of oil produced would be required. This water would be used in mining for dust control, reclamation for initial vegetation growth and for plant infrastructure needs.

The successful completion of the Demonstration Program, and then the Production Program, led to the next logical step in the oil shale development. In July of 1979, Paraho responded to a solicitation by the Department of Energy for proposals to design and demonstrate a commercial, full-size oil shale retort or module. A module consists of a mine to produce the oil shale, a

single, 10,000 barrel per day retort to recover the shale oil and gas, and all the supporting equipment required. Paraho's proposal was selected and the module contract was executed with the Department of Energy in June 1980. This contract calls for an 18 month program costing approximately $9 million. Paraho is managing the program with cost being shared approximately equally by the Department of Energy and a group of fourteen industry sponsors. The industry sponsors are: ARCO Coal, Chevron, Conoco, Davy McKee, Husky, Mobil, Mono Power (Southern California Edison), Phillips, Placid Refining, Sohio, Sun, Texaco, Texas Eastern, and The Cleveland-Cliffs Iron Company. Sohio, McKee, Cliffs, and three environmental firms serve as sub-contractors to Paraho.

The DOE, in September of 1980, awarded Paraho a grant of over $3 million. The grant provided funds for preparing a Commercial Feasibility Study covering the expansion of the single module retort into a commercial three retort facility capable of producing over 30,000 barrels per day of shale oil. The successful completion of the module design and engineering effort and the Commercial Feasibility Study could lead to the construction and operation of a Paraho retort as early as 1984. Both of these studies are well underway. The site of the facilities are some 40 miles southeast of Vernal, Utah, on Paraho's State of Utah oil shale lease and a private sublease.

Paraho is excited about its role in the development of a new industry. Paraho has demonstrated that it can produce large amounts of shale oil under environmentally acceptable conditions and that the shale oil can be commercially refined into products which we use on a daily basis. Yes, the time for commercial development of oil shale is now and Paraho expects to play a major role in this development--For the Good of Mankind.

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Sentinel photo by Lloyd Levy

Paraho president Harry Pforzheimer II, shows site
...Synthetic Fuel Corp. VPs impressed by shale country

Synfuel Corp. VPs tour area shale sites

Shale country leaves big impression

By Lloyd Levy
Sentinel staff writer

RIFLE — "I'm impressed," said a bearded Bill Rhatican, clad for an outing Thursday in blue jeans and boots. The vast oil shale country of northwestern Colorado apparently had made an impact.

Rhatican, a New Jersey native on his first visit to the western part of the state, is the Synthetic Fuels Corp.'s newly appointed vice president for public affairs.

"I'm impressed with the potential of this resource," said Rhatican. His comment — made against a backdrop of the jutting oil shale cliffs of Anvil Points and the Paraho project's clanking oil shale processor — came at the end of a long day's tour.

Traveling in three hellcopters, Rhatican and ten other high-level staff members of the Synthetic Fuels Corp. were making the rounds of ongoing oil shale projects "to learn more about the subject," said Larry Lukens, SFC's acting vice president for project development.

While Lukens is a veteran of oil shale programs in the Navy and the Department of Energy, many of the SFC staff members on the tour were, like Rhatican, new to the field, said Lukens.

The group included Chev Haskell, vice president for planning, Len Axelrod, vice president for tecnology and engineering, "a couple" of assistant vice presidents and other staff members, said Rhatican.

John Sawhill, president of the corporation, attended meetings in Denver Wednesday but didn't join the group Thursday. Sawhill visited the Paraho project and several other Western Slope shale sites in November.

Bad weather in Grand Junction Thursday morning forced a change in the group's travel plans. Instead of flying, the SFC officials drove to Occidental Oil Shale's experimental site at Logan Wash.

They returned to Grand Junction and, with skies clearing, finally took to the air to visit Occidental's project on federal-lease tract C-b and the Rio Blanco Oil Shale project on federal-lease C-a. They arrived at Paraho at around 3 p.m., about two hours behind schedule.

The tour was to continue today with visits to the Union Oil's and Exxon-Tosco's projects on Parachute Creek.

At Anvil Points Thursday, Harry Pforzheimer II, Paraho president, showed the SFC tourists his company's pilot shale-oil-recovery project in action processing the last of a 200-metric-ton load of oil shale from Morocco. The experimental run which began Jan. 13 was to end today, said Earl Mast of Paraho.

Later, while most of the SFC tourists met privately with Paraho officials, Lukens and Rhatican answered reporter's questions.

While in the west, the SFC contingent also has made a series of public contacts, said Lukens. The group, including Sawhill, arrived in Denver Tuesday.

Sawhill met with representatives of "all the major environmental interest groups" Tuesday night, and the entire SFC entourage ate breakfast Wednesday with officials from six western states and a number of Colorado county officials, Lukens said.

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Later Wednesday, a public workshop for prospective applicants for SFC financial aid drew 475 to 500 persons. The session included briefings on the corporation's method of operation, its selection criteria and pointers on how to submit proposals, said Lukens.

The Denver workshop was the second such meeting, Lukens said. The first on Jan. 19 in New York also drew 500 persons. Attendance figures for both sessions were double what they'd expected, said Rhatican.

"We're very encouraged at this time. I would guess, during the first round, we could see as many as 100 proposals," said Lukens.

Rhatican said proposals already are coming in. There is a March 31 cutoff for the first round, but the corporation will begin accepting applications again shortly after that, Rhatican said.

Modeled after investment banks, the corporation is meant to aid private synthetic fuels producers mainly with loan and price guarantees, said Lukens. It is presently funded with $20 billion.

Environmental control need not be costly

By George Orbanek
Sentinel staff writer

In what some researchers are calling the first concrete analysis of the issue, a report examining the environmental control costs of oil shale development concludes that "a high level of (environmental) control can be achieved at reasonable cost."

Moreover, the report indicates that the environmental control costs of above ground surface retorting are less than the much-ballyhooed, underground modified in situ process developed by Occidental Oil Shale, Inc.

Despite indications that a high degree of environmental protection can be maintained at reasonable costs, the report emphasizes "the true answers to the critical environmental questions are still not completely understood."

According to the report, "The true answers will only be known after commercial plants have been built and successfully operated."

The report also concludes that additional research and development appears warranted to determine the exact cost of adequate environmental control.

The two-inch thick document was prepared last fall for the Department of Energy by the Denver Research Institute (DRI), a department of the University of Denver, and the Mitre Corp. of MacLean, Va.

Analysts from DRI and Mitre both said the report's conclusions appear to debunk previous high environmental control cost estimates for oil shale processing.

Andy Jovanovich, a DRI analyst instrumental in developing the report, said, "We didn't start out with any preconceived notions other than we thought the Department of Energy costs (estimates) were pretty high."

And Marvin Drabkin of the Mitre Corp. characterized some of the DOE cost estimates as "off the wall."

Richard Bradley, a resource economist with the DOE, also acknowledged that the report's findings show environmental control costs being less than previous estimates.

"The conventional wisdom on those numbers were that they were significantly lower than we anticipated," said Bradley.

He added, however, "Whether or not that's true is debateable."

Asked why the conventional wisdom assumed very high environmental control costs for oil shale processing, Bradley said until development of the DRI-Mitre report, "only limited studies" on the subject had been done.

Until development of the DRI-Mitre report, environmental control cost estimates for oil shale development typically ranged well above 30 percent of total plant costs.

Harry Pforzheimer III, a spokesman for the Paraho Development Corp., said he recalled environmental control cost estimates for the oil shale industry ranging as high as 35 to 40 percent of the total capital costs of a commerical oil shale facility.

Paraho's direct mode above ground retorting is one of four shale oil processing methods examined in the report. The Tosco II above ground retorting process is also examined in the report as well as two modified in situ processes developed by Occidental Oil Shale, Inc.

For both Paraho's and Tosco's surface retorting, the ratio of environmental costs to total process costs was in the 4 percent to 10 percent range. But for the underground modified in situ process, the environmental control estimates were three times higher.

Occidental's modified in situ approach has often been trumpeted as the most environmentally acceptable oil shale development process.

Mitre's Drabkin said a critical unanswered question about the modified in situ development process is how to insure adequate protection of underground aquifers.

"I believe one of the key questions will be how to handle the spent retorts," said Drabkin.

Additionally, Drabkin said, stringent water treatment techniques likely will have to be applied using the modified in situ approach.

"You conceivably could have huge evaporation ponds on those plateaus," said Drabkin.

Despite repeated telephone inquiries, Occidental officials declined to comment on the report.

Pete Rutledge, the Grand Junction-based mining supervisor for the federal government's leasing program, said environmental questions still remain about large-scale commercial development of shale oil. He acknowledged that an effective way to seal off underground retorts has yet to be demonstrated.

"Assuming that you have to do something—what?" he said. "We can't really quantify that until we build a big one and test it."

Rutledge said neither above ground oil shale development or modified in situ processing should be considered "the savior" for unanswered environmental questions.

TOTAL ENVIRONMENTAL CONTROL COST DOLLARS PER BARREL OF SYNCRUDE EQUIVALENT*

Process	DRI Estimate	MITRE Estimate
Paraho Direct Mode	0.99	1.7
TOSCO II	2.00	3.7
MIS	2.99	11.1
MIS-Lurgi	2.30	9.0

*In 1979 dollars

The costs

Total environmental control cost includes: Direct operating costs, capital recovery costs, other indirect costs, all appropriate by-product credits. The figures in the DRI study were calculated using a "less strict" environmental regulatory scenario which assumes that regulations would not be unusually or unreasonably restrictive. DRI also calculated costs given "more strict" regulatory assumptions and these costs were 10 percent to 20 percent higher than the DRI range indicated above.

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Paraho sees Utah as its best bet

The revelation that Paraho Development Corp probably would shift its commercial shale oil operation to its Utah site if it were chosen by the government to build a full-scale demonstration module shocked many persons. It shouldn't have. Such an announcement has been in the making for a number of years now. The plan didn't come about overnight.

The key point to remember is that Paraho does not now intend to abandon its Anvil Points operation near Rifle. Company officials insist that the works there will be retained and will continue to serve as a laboratory site for future oil shale studies. Only the commercial program would be conducted at the site near Vernal.

Paraho spokesman Harry Pforzheimer III indicated the decision to shift commercial operations to Utah hinged on two points: The holdup in getting an environmental impact statement for the Anvil Points site because of federal fiddle-faddling and muddling, and the fact that Paraho's lease period is too short for development of a full-module program. The firm also feels it is more practical and cheaper to start from scratch with a new plant near Vernal than to tear down and rebuild the Anvil Points works which are obsolete.

These reasons, however, have evolved after years of frustration. After great expense and slow development, Paraho had reached the point in the mid-'70s where it was prepared, with the aid of other cooperating firms, to produce shale oil in commercial quantities. It had the financial support of 17 companies to build a full-scale module to turn out from 6,000 to 10,000 barrels of shale oil a day. Then an oil price decontrol plan ran aground and the shale development project sunk.

Paraho also was bedeviled by the Colorado Open Space Council and its chief terror, Kathy Fletcher, a dedicated environmentalist who later joined the Carter staff. The COSC threatened to sue the old energy agency, ERDA, if it didn't complete an EIS on the Paraho project. That EIS still is lost somewhere in the Department of Energy labyrinth.

Paraho unquestionably has demonstrated the viability of its oil shale technology on a semi-works scale. It is the only company that has produced significant quantities of shale oil. This oil has been refined and has been use tested by the Navy. However, Paraho is at the mercy of the federal government because it is operating on a Naval Reserve under a federal lease agreement which will expire within a couple of years. So far lease renewal has kept pace with the EIS.

When COSC threatened suit and the EIS got tangled in bureaucratic red tape, apparently Paraho executives looked at their cards and decided Anvil Points would serve as a fine laboratory but that any future commercial plant should be on the company's own land in Utah, a state which has presented a more pleasant and friendly countenance to industry than Colorado.

Some have interpreted the Paraho announcement as a scheme to pressure the government into clearing the EIS immediately or speeding up the lease renewal process. At one time that might have been true. Now, apparently, the company's executives are settled on Utah and the firm's own oil shale reserve as the site of any possible commercial shale oil venture.

While the loss of Paraho to Utah may be disappointing, it is far from critical. If oil shale is developed as the energy situation and common sense dictate, there may be a score of commercial operations going in our area within a decade. Utah development always has been envisioned as part of the greater Colorado program and Paraho's plans only confirm that viewpoint.

If the Paraho technology works in Utah we can anticipate that through a licensing procedure, it will be used in many future Western Colorado plants built by other companies.